

(شرح ٢٠٢١)

Arab Republic of Egypt  
Ministry of Education

General Secondary Education Certificate Examination – First Session 2021  
[Third Year Secondary]

Statistics

Time: 1 ½ Hours

( الإجابة في نفس حراسة الأسئلة )

( الإجابة بالإنجليزية ) لصف الثالث الثانوي العام ( الدور الأول ٢٠٢١ )

Calculator is allowed

(صفحة)

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First : Choose the correct answer:-

(1) The correlation coefficient( $r$ ) between two variables is a perfect direct correlation when  $r \in$ —

- ☒ (1)
- ☐ (b)  $[-1]$
- ☐ (c)  $[zero]$
- ☐ (d) 0

(2) If A and B are two independent events such that:  $P(A) = 0.4$  ,  $P(B) = 0.5$ ,  
then  $P(B - A) =$ —

- ☐ (a) 0.6
- ☐ (b) 0.7
- ☒ (c) 0.3
- ☐ (d) 0.8

$$P(A \cap B) = P(A) \times P(B) = 0.2$$

$$P(B - A) = 0.5 - 0.2 = 0.3$$

\*( في الأسئلة في الصفحة التالية )\*

(3) If  $X$  is a normal random variable whose mean  $\mu=165$

,  $P(X > 180) = 0.0668$ , then its standard deviation  $\sigma = \dots$

(a) 100

☒ (b) 10

(c) 5

(d) 1

$$P(Z > \frac{180 - 165}{\sigma}) = 0.0668$$

$$P(Z > \frac{15}{\sigma}) = 0.4332$$

$$\frac{15}{\sigma} = 1.5 \quad \therefore \sigma = 10$$

(4) If  $A$  and  $B$  are two events in a sample space  $S$  of a random experiment

such that:  $P(A \cap B) = \frac{1}{4}$ ,  $P(B^c) = \frac{3}{8}$  then  $P(A|B) = \dots$

(a)  $\frac{1}{5}$

(b)  $\frac{1}{8}$

(c)  $\frac{5}{8}$

☒ (d)  $\frac{5}{12}$

$$P(B) = 1 - \frac{3}{8} = \frac{5}{8}$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{1}{4}}{\frac{5}{8}} = \frac{2}{5}$$

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(5) If  $X$  is a normal random variable whose mean ( $\mu$ ) and its standard deviation ( $\sigma$ ), then  $P\left(\mu - \frac{3}{2}\sigma \leq x \leq \mu + \frac{3}{2}\sigma\right) = \dots$

- ☒ 0.8664
- ☐ 0.7062
- ☐ 0.3830
- ☐ 0.4332

$$P\left(-\frac{3}{2} \leq Z \leq \frac{3}{2}\right) \\ = 2 \times 0.4332 = 0.8664$$

(6) If  $A$  and  $B$  are two events of the sample space  $S$  of a random experiment, where  $P(A) = 0.45$ ,  $P(B) = 0.6$ ,  $P(A|B) = 0.6$  then  $P(B|A) = \dots$

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- ☐ 0.2
- ☐ 0.4
- ☐ 0.6
- ☒ 0.8

$$\frac{P(A \cap B)}{P(B)} = 0.6$$

$$P(A \cap B) = 0.36$$

$$P(B|A) = \frac{P(A \cap B)}{P(A)} = 0.8$$

« (١٠٢١، ش.ع) »



(7) If  $x$  is a discrete random variable whose probability distribution is as follows:

$X_i$	0	1	2	5
$P(X_i)$	0.1	0.2	K	0.4

Then the value of  $K =$  \_\_\_\_

- ☐ (a) 0.8  
☐ (b) 0.7  
☐ (c) 0.5  
☒ (d) 0.3

$$0.1 + 0.2 + K + 0.4 = 1$$

$$\therefore K = 0.3$$

Secondly: Answer the following questions

(8) If X is a continuous random variable whose probability

density function is:  $f(x) = \begin{cases} \frac{1}{14}(2x+3) & , 1 \leq x \leq 3 \\ \text{Zero} & , \text{otherwise} \end{cases}$  , Find  $P(X \geq 2)$

$$\begin{aligned} P(X \geq 2) &= 1 - P(2 \leq X \leq 3) \\ &= \frac{1}{2} [f(2) + f(3)] (3-2) \\ &= \frac{1}{2} \left[ \frac{1}{2} + \frac{4}{14} \right] = \frac{4}{7} \end{aligned}$$

(9) calculate Spearman's ranks correlation coefficient between X,Y from the data Of the following table

X	80	60	20	30	40	50
Y	75	80	40	50	60	70

$$r = 1 - \frac{6 \sum D^2}{n(n^2-1)}$$

$$= 0.94$$

X	Y	R <sub>x</sub>	R <sub>y</sub>	D	D <sup>2</sup>
80	75	6	5	1	1
60	80	5	6	-1	1
20	40	1	1	0	0
30	50	2	2	0	0
40	60	3	3	0	0
50	70	4	4	0	0
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- (10) A bag contains 10 identical balls , 4 of them are white balls and 6 are red balls. Two balls have been drawn one after another with replacing, Find the probability of the two drawn balls are red

$$\frac{6}{10} \times \frac{6}{10} = \frac{36}{100}$$

$$= 0.36$$

- (11) If the mean of a random variable equals 150 and its coefficient of variation equals 2 %, find the variance of the random variable

$$\text{Coeff. of Variation} = \frac{\sigma}{\mu} \times 100$$

$$\frac{\sigma}{150} = \frac{2}{100} \Rightarrow \sigma = 3$$

$$\sigma^2 = 9$$



(12) If  $\sum X = 10$  ,  $\sum Y = 20$  ,  $\sum XY = 50$  ,  $\sum X^2 = 30$  ,  $\sum Y^2 = 90$   
and  $n=5$  , Find the correlation coefficient between X and Y

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}}$$

$$= 1$$

(13) If Z is a standard normal random variable such that

$P(-K \leq Z \leq K) = 0.7330$ , then find the value of K

$$2P(0 \leq x \leq K) = 0.7330$$

$$P(0 \leq x \leq K) = 0.3665$$

$$\therefore K = 1.11$$

\*\*\* انتهى الأستاذ \*\*\*